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Solid Waste
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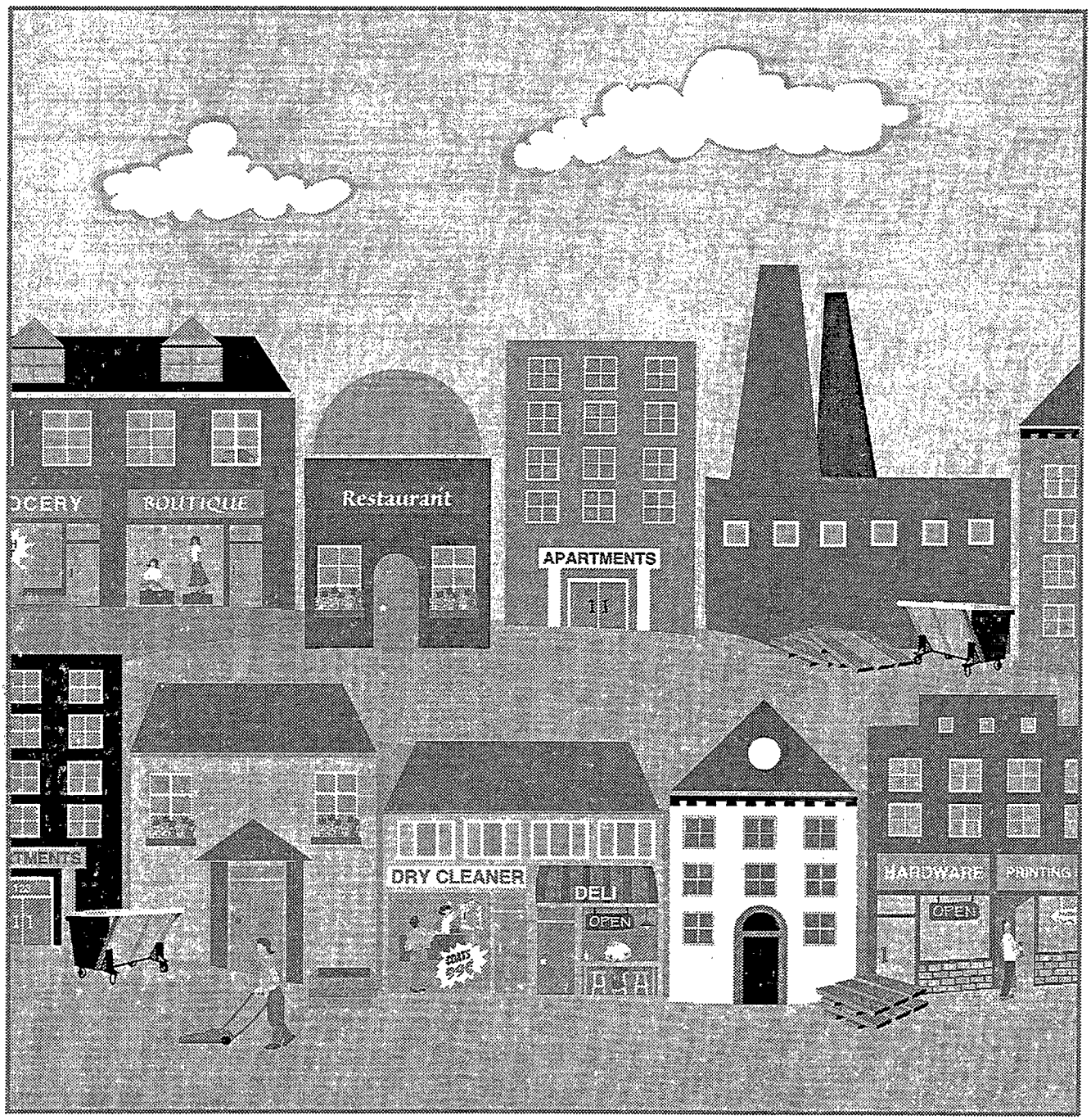
Source Reduction Program Potential Manual

A Planning Tool



Printed on paper that contains at least 20 percent postconsumer fiber.

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About This Manual

This manual is designed to help local solid waste managers determine the potential impact of various source reduction options. The manual examines the **program potential, or the portion of a waste stream category that could be addressed by a specific source reduction program.** Analyzing program potential can help solid waste managers decide whether to include source reduction in their integrated solid waste management plans.

Using data on the national municipal solid waste stream, this manual calculates the program potential for six source reduction options: three residential options (grasscycling, home composting, and clothing reuse) and three commercial, industrial, and institutional options (office paper reduction, converting to multi-use pallets, and paper towel reduction). It then shows managers how to calculate program potential locally by applying their own data.

While the manual acts as a planning guide for source reduction programs, it does have some limitations. First, the manual is limited to estimating the potential of source reduction programs. The actual tonnage reduction achieved by a source reduction program will depend on the effectiveness of the program's implementation. Second, the manual is not a "how to" document for designing and implementing a source reduction program. Finally, the manual does not specifically address reducing the toxicity of the waste stream.

To make it easier to calculate program potential, companion software is also available. To order, call the Resource Conservation and Recovery Act Hotline at 800 424-9346.

Glossary

The following is a list of terms that appear frequently throughout this manual. Readers may wish to keep this list handy so they can refer to it as they proceed through the document.

Applicability Factor: This factor narrows the tonnage of the general waste category to that of the specific waste category relevant to the source reduction option.

CII: Solid waste activities associated with the commercial, industrial, and institutional sectors.

Feasibility Factor: This factor narrows the tonnage of the specific waste category to reflect only the portion that could feasibly be reduced.

Program Potential: The portion of a waste stream category that could be addressed by a specific source reduction program.

Program Potential Factor: A percentage that, when applied to the tonnage of a general waste category, yields the program potential of a specific source reduction option.

Source Reduction: Activities designed to reduce the volume or toxicity of the waste stream, including the design and manufacture of products and packaging with minimum toxic content, minimum volume of material, and/or a longer useful life.

Technology Factor: This factor accounts for any waste that might remain in the waste stream, as a result of technical or physical limitations, even after the source reduction option is implemented successfully.

Chapter 1
Introduction

In February 1989, the U.S. Environmental Protection Agency (EPA) published the report *The Solid Waste Dilemma: An Agenda for Action.* This report called for the adoption of "a new solid waste management ethic" reflected in what has come to be referred to as the "solid waste management hierarchy." While acknowledging variations in local conditions, the hierarchy established a preferred order to municipal solid waste (MSW) management. Source reduction was at the top of the hierarchy, followed by recycling (including composting) and disposal (including combustion and landfilling).

What Is Source Reduction?

EPA defines source reduction as activities designed to reduce the volume or toxicity of waste generated, including the design and manufacture of products with minimum toxic content, minimum volume of material, and/or a longer useful life.

Source reduction is fundamentally different from the other elements of the solid waste hierarchy. Recycling and disposal options all come into play after goods have been used. Source reduction, in contrast, takes place before materials have been identified as "waste." To implement source reduction, solid waste managers need to promote practices that reduce waste before it is generated.

A variety of practices exist to promote source reduction in local communities. These practices affect both the residential and the commercial, industrial, and institutional (CII) sectors. This manual focuses on six source reduction options:

Residential Sector Options:

- Grasscycling
- Home composting
- Clothing and footwear reuse

CII Sector Options:

- Office paper reduction
- Converting to multi-use pallets
- Paper towel reduction

These six options were chosen because they have been implemented in communities across the country and, in some cases, have contributed significantly to local solid waste management efforts.

What Is Program Potential?

Before implementing a source reduction program, managers need to determine the portion of their waste stream that could be addressed by source reduction. This manual refers to this portion as "program potential."

Understanding program potential helps managers determine whether a specific source reduction program makes sense for their community. This decision is ultimately based on whether a program has the potential to reduce a significant portion of the waste stream in a cost-effective manner. Calculating program potential is the first step in determining whether to implement source reduction programs locally.

What Is a Program Potential Factor?

This manual develops program potential factors, or percentages, based on the national program potential results. To calculate the program potential for their local waste stream, solid waste managers can multiply the tonnage of a specific component of their local waste stream by the corresponding program potential factor from Table 5.2. For example, the grasscycling calculation in Chapter 3 identifies the national tonnage of yard trimmings that could be prevented if homeowners left their grass clippings on the lawn. The program potential factor represents the national program impact in tonnage, 9.1 million tons, as a percentage, 33.1 percent, assuming that all homeowners left their grass clippings on the lawn.

Using this percentage, or program potential factor, managers can convert their waste stream generation tonnage into program potential. For example, by multiplying the tonnage of yard trimmings generated locally by 33.1 percent, managers can estimate the program potential for diverting grass clippings from the waste stream in their community. Managers interested in customizing the analysis to better reflect local conditions may want to review the assumptions underlying the calculation of the national program potential and make adjustments to the program potential factors, as appropriate. The worksheets in Chapter 6 will help managers with these calculations.

Program Potential Factors

Program potential factors represent the impact of a source reduction program option as a percentage rather than as a tonnage. To arrive at a quick estimate of program potential, solid waste managers can multiply the tonnage of a specific component of their local waste stream by the corresponding program potential factor. For managers interested in developing customized program potential factors based on local data, Chapter 5 describes the method for calculating program potential factors.

Chapter 2
Program Potential

To calculate program potential, solid waste managers will need to:

- Gather or estimate data on the tonnage and composition of their MSW stream.
- Apply a set of program potential factors to their local waste stream data.

Gathering Data

Program potential can be calculated using either national or local data. Chapters 2, 3, and 4 of this manual explain how to calculate program potential using national data. Chapter 5 and the companion software show managers how to calculate program potential using local data or a combination of national and local data.

The basic source of national data on the MSW stream is EPA's *Characterization of Municipal Solid Waste in the United States: 1994 Update* (the '94 Update) and *1995 Update* (the '95 Update). These documents present current information on the volume and composition of MSW, as well as projections for the future. Table 2.1 summarizes the information for 1994 presented in the '95 Update.

Most of the information in the '95 Update is not based on direct measurement (i.e., sampling measurement). Instead, it is developed from a "cradle-to-grave" analysis of the materials flow in the U.S. economy. Managers unfamiliar with this approach may wish to consult the '95 Update. Understanding the methods used in the '95 Update is not required for using this manual.

Calculating Program Potential

Program potential can be calculated using the equation shown in Figure 2.1. This equation limits the tonnage of a general waste category to the portion of a specific waste category that could be addressed by a source reduction program, or the program potential.

*Table 2.1. The 1994 National Solid Waste Stream**

General Waste Category	Residential Waste Generated (Million Tons)	CII Waste Generated (Million Tons)	All Waste Generated (Million Tons)
Paper and paperboard	36.4	44.9	81.3
Glass	10.7	2.5	13.2
Metals	10.3	5.5	15.8
Plastics	15.3	4.5	19.8
Wood	3.5	11.1	14.6
Food scraps	7.0	7.1	14.1
Yard trimmings	27.5	3.1	30.6
Other	10.0	9.6	19.6
Total	**120.7**	**88.3**	**209.0**

* EPA's *Characterization of Municipal Solid Waste in the United States: 1995 Update.*

For example, consider a source reduction program intended to keep grass from entering the MSW stream. Grasscycling programs simply encourage homeowners to leave grass clippings on their lawns rather than bag and dispose of them. To develop an estimate of program potential for grasscycling, the first step is to narrow the tonnage of grass in yard trimmings that is residential. Next, the applicable grass tonnage is further narrowed to reflect an estimate of the portion of grass cut with nonmulching mowers and the portion of grass clippings left on the lawn under current grasscycling programs. Finally, technological limitations must be taken into consideration. The program potential calculation yields a value representing the amount of material available for source reduction by a given program.

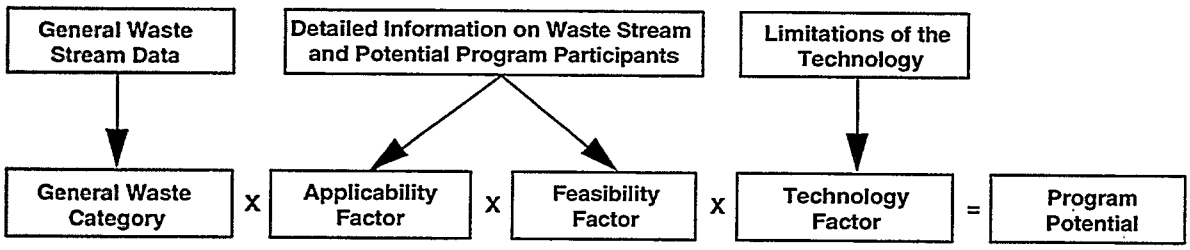
The program potential equation shown in Figure 2.1 involves four steps:

- **Step 1:** Identify the general waste stream category relevant to the source reduction option being considered and specify its tonnage. For example, when estimating the program potential for grasscycling, the general waste stream category is yard trimmings. Its tonnage is shown in Table 2.1.
- **Step 2:** Multiply by an "applicability factor." The applicability factor reduces the tonnage of the general waste category to a specific waste category directly relevant to the option under consideration. For grasscycling, this is the portion of yard trimmings that is grass generated by the residential sector.
- **Step 3:** Multiply by a "feasibility factor." This factor reduces the portion of the specific waste category to the tonnage that feasibly could be reduced through source reduction efforts. For grasscycling, this involves estimating the portion of grass reduced through current grasscycling programs.
- **Step 4:** Multiply by a "technology factor." This factor takes into account any technical or physical limitations to the option under consideration. For grasscycling, there are no limitations—that is, all of the portion identified in Step 3 could be addressed by a source reduction program.

Multiplying the general waste category tonnage by these three factors results in a tonnage of waste that **could** be addressed by a source reduction program, assuming 100 percent participation in the program.

Calculations performed in Chapters 3 and 4 make use of national data to estimate program potential; local data may differ. Chapter 5 provides an opportunity to incorporate local data into the calculations.

Figure 2.1. The procedure for estimating program potential for source reduction.



Chapter 3
Residential Source Reduction Options

National Program Potential

This chapter presents estimates of national program potential for three residential source reduction program options: grasscycling, home composting, and clothing reuse. As Table 3.1 shows, the national program potential associated with these three options in 1994 is 23.7 million tons.

Grasscycling

Grasscycling programs are one of the simplest ways to divert organic materials from the MSW stream. This manual focuses on how mulching mowers are used in residential grasscycling programs.

Grasscycling programs encourage homeowners to leave grass clippings on their lawns rather than bag and dispose of them. According to the Composting Council and many other community programs, grasscycling not only diverts a significant portion of the waste stream, but also provides an excellent source of nutrients for the lawn. Grasscycling can be accomplished with the help of mulching mowers. Mulching mowers' fine chopping blades help speed up grass clipping degradation. Many mowers sold today are capable of mulching, and old mowers can be retrofit to mulch or re-cut grass clippings.

Historically, most grasscycling programs rely on public education to encourage households to grasscycle. This typically involves developing and distributing pamphlets that explain the various benefits of grasscycling. These benefits include decreasing homeowners' fertilizer and water bills, saving the time and energy spent bagging and hauling grass clippings, and reducing the amount of material in the waste stream. Press releases, brochures, and newspaper, radio, and television advertisements are all means of communicating the benefits of grasscycling programs.

Program Potential

- **General Waste Category.** The general waste category addressed by grasscycling is yard trimmings. As shown in Table 2.1, the yard trimmings tonnage reported in the '95 Update is 30.6 million tons.

Table 3.1. National Program Potential for Residential Source Reduction Options

Source Reduction Option	Component of MSW Reduced	Program Potential (Million Tons)
Grasscycling	Yard trimmings	9.1
Home composting	Food scraps & yard trimmings	13.0
Clothing and footwear reuse	Other	1.6
Total		**23.7**

- **Applicability Factor.** This factor reduces the general waste tonnage to reflect only the tonnage of grass generated by the residential sector. Data in the '95 Update show that approximately 50 percent of yard trimmings are grass clippings. The '94 Update states that 90 percent of the grass clippings are generated by the residential sector. Therefore, the applicable portion of yard trimmings is 45 percent (0.5 x 0.9).
- **Feasibility Factor.** Since there are no national data on the number of households that currently grasscycle, several assumptions must be made to take current practices into account. First, the lawn mower manufacturer Toro estimates that 99 percent of residential households use power mowers to mow their lawns. According to Toro, 26 percent of the power mowers used are mulching mowers.

  In addition, local grasscycling programs encourage people without mulching mowers to grasscycle. Lacking any national data on these programs, it is assumed that 10 percent of the people currently using nonmulching mowers are grasscycling. Therefore, the portion of residential grass feasible to be source reduced through grasscycling is 66 percent (0.99 x 0.74 x 0.9).
- **Technology Factor.** The technology factor is 100 percent, because all grass that is left on lawns is removed from the waste stream.
- **Program Potential.** The national program potential is 9.1 million tons per year.

Home Composting—Food Scraps

Home composting programs are an increasingly popular residential source reduction program option. By composting, households can divert large percentages of their food scraps and yard trimmings from the waste stream.

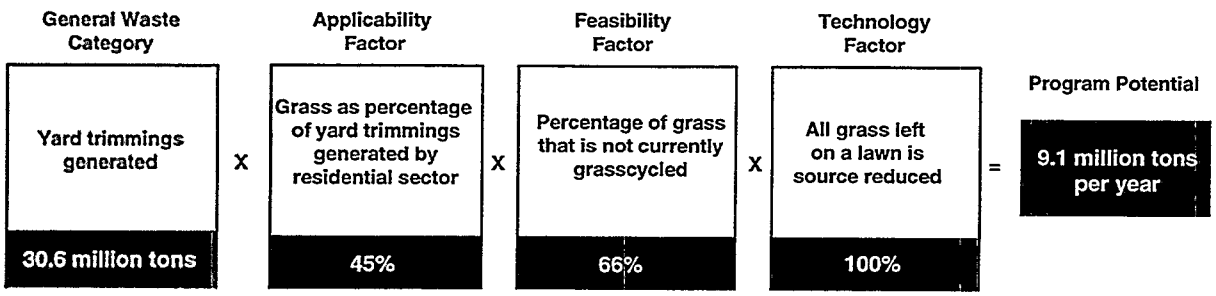
Home composting programs are typically organized at the county or city level and involve educating homeowners about proper composting practices and encouraging the diversion of all organic materials. Many communities with backyard composting programs implement public education and outreach programs to encourage homeowners to compost. These entail distributing flyers and brochures, producing videos and radio advertisements, and displaying home composting bins with instructions and information at public events, gardens, and home gardening stores.

In addition, many communities develop "Master Composter Programs." In these programs, a compost specialist trains a group of volunteers, who become "Master Composters." They in turn train others in the community on proper composting techniques.

Program Potential

Unlike the other source reduction options considered in this manual, home composting applies to two major categories of the waste stream—food scraps and yard trimmings. To estimate the program potential for home composting, the contribution of these two categories

Figure 3.1. Program potential for grasscycling.



needs to be addressed separately. The calculation for food scraps, shown in Figure 3.2a, is presented here in detail. The analysis for yard trimmings, shown in Figure 3.2b, is summarized at the end of this section.

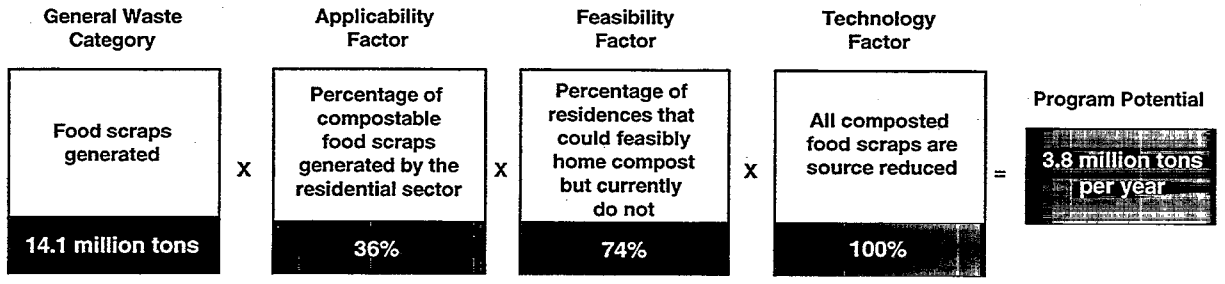
- **General Waste Category**. The general waste category addressed by home composting is food scraps. As shown in Table 2.1, 14.1 million tons of food scraps were generated by the residential and commercial sectors in 1994.
- **Applicability Factor.** This factor reduces the waste tonnage to reflect only the tonnage of residential food scraps that are compostable. According to a waste composition study by William Rathje, Director of the Garbage Project at the University of Arizona, 72 percent of food scraps are compostable. This exempts meat, fish, cheese, milk, and fats and oils. In addition, the '94 Update estimates that 50 percent of food scraps are generated by the residential sector. Therefore, the portion of waste that is generated by the residential sector and is compostable is 36 percent (0.72 x 0.5).
- **Feasibility Factor.** The residential tonnage is narrowed further to reflect only food scraps that could feasibly be home composted. According to the Statistical Abstract of the United States, approximately 75 percent of the population lives in one to four unit residences and is likely to have the space to home compost. Absent actual data on food scrap composting, it is assumed that 1 percent of households in the nation currently compost in their backyard and that 99 percent do not. Therefore, the portion of food scraps that feasibly could be reduced is 74 percent (0.75 x 0.99).
- **Technology Factor.** The technology factor is 100 percent, because backyard composting removes all of the food scraps that are composted from the waste stream.
- **Program Potential.** The program potential for home composting of food is therefore 3.8 million tons per year.

Home Composting–Yard Trimmings

In the analysis of home composting of yard trimmings, only the general waste category and applicability factor need to be changed. The yard trimmings tonnage, as shown in Table 2.1, is 30.6 million tons. Based on the '94 Update, 90 percent of yard trimmings come from the residential sector. Making a 10 percent allowance for large items, such as tree trunks and large limbs that are not easily compostable, the applicability factor for yard trimmings is 81 percent (0.9 x 0.9). The feasibility and technology factors developed for food scraps apply equally well to yard trimmings. Also, for this example, the 9.1 million tons of program potential for grasscycling is excluded to avoid double counting. The national program potential for composting yard trimmings is 9.2 million tons (30.6 x 0.81 x 0.74 x 100 - 9.1).

Combining the program potentials for home composting of food scraps (3.8 million tons) and yard trimmings (9.2 million tons) yields a national program potential for home composting of 13.0 million tons. However, if the program potential for grasscycling is not excluded, the national program potential for yard trimmings is 22.1 million tons a year.

Figure 3.2a. Program potential for home composting food scraps.



Clothing and Footwear Reuse

A residential textile collection program provides an efficient and convenient opportunity for residents to extend the useful life of unwanted textile goods, such as clothing and footwear. Communities can establish drop-off collection sites, offer periodic curbside collection, or integrate textiles into their ongoing curbside collection programs. This manual assumes that all collection approaches for textiles have the same source reduction program potential.

This manual focuses solely on the collection of clothing and footwear for reuse. Most residential collection programs, however, collect other textiles as well, such as sheets, towels, and draperies. Reuse opportunities for clothing and footwear include reuse as secondhand clothing, both domestic and foreign, and as wiping or polishing rags.

Local agencies that have instituted residential textile collection programs concur that public education is a key component to success. Many communities encourage residents to first donate items to local charities, and then give what these nonprofits cannot use to the local collection program. This often results in increased donations to charities, as well as a high level of residential collection.

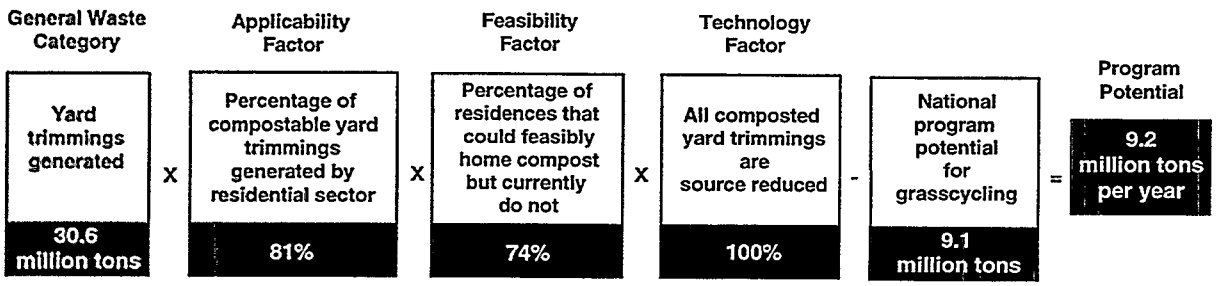
Program Potential

- **General Waste Category.** The general waste category addressed by textile collection is other waste. As shown in Table 2.1, 19.6 million tons of other waste were generated in 1994, as reported in the '95 Update.
- **Applicability Factor.** This factor reduces the general waste tonnage to reflect the portion of other waste consisting of residential clothing and footwear that is currently not recovered. According to the '95 Update, 4.5 million tons of clothing and footwear are generated annually, representing approximately 23 percent of other waste. The '94 Update estimates that 60 percent, or 2.7 million tons, of clothing and footwear is generated by the residential sector.

  According to the Council for Textile Recycling (CTR), approximately 1.25 million tons of postconsumer textiles are recovered annually. This figure represents all types of textiles from various sources. CTR describes the flow of textiles as first being donated to nonprofit, charitable organizations, such as Goodwill and Salvation Army, which in turn sell any unusable textiles to businesses, such as textile dealers and brokers.

  Of the 1.25 million tons of textiles recovered, the portion that is only clothing and footwear donated by households must be derived. Goodwill estimates that 95 percent of the textiles it receives

*Figure 3.2b. Program potential for home composting yard trimmings.**



*excluding the national program potential for grasscycling.

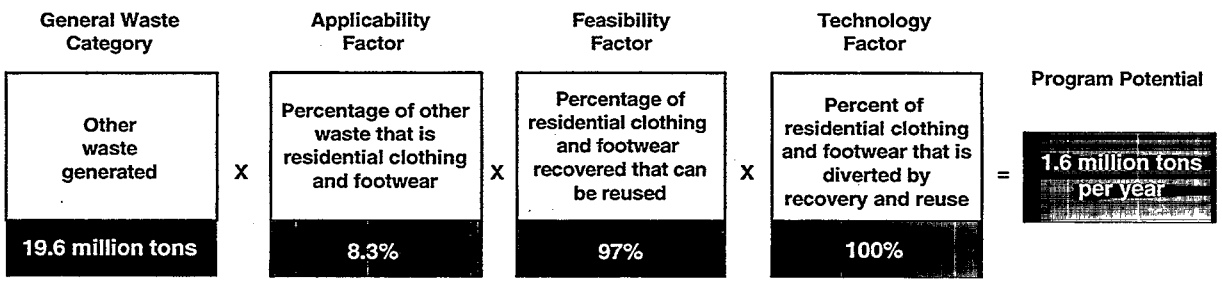
consists of clothing and footwear. In addition, Goodwill also estimates that 90 percent of its textile donations come from households. Applying this figure for all nonprofits accepting textiles, 85.5 percent (0.95 x 0.90) of the textiles recovered is clothing and footwear from households, which translates to 1.07 million tons annually. By subtracting the amount of clothing and footwear donated by households from the total amount of residential clothing and footwear generated, 1.63 million tons, or 60 percent, could be targeted for a source reduction program. Therefore, the applicable portion of other waste generated is 8.3 percent (0.23 x 0.60 x 0.60).

- **Feasibility Factor.** To derive the feasibility factor, the portion of recovered residential clothing and footwear that is available for reuse must be calculated. Of the clothing and footwear donated to nonprofits, a portion is reused and the remainder is sold to businesses. Goodwill estimates that 50 percent of the clothing and footwear received is sold in its stores and reused. The remaining 50 percent is sold to businesses. What these businesses do with the textiles must also be considered. CTR estimates that these businesses reuse and reprocess 94 percent as secondhand clothing, wiping and polishing cloths, or are used to make similar textile items. Thus, the feasibility factor is 97 percent [0.50 + (0.50 x 0.94)].
- **Technology Factor.** The technology factor is 100 percent, since clothing and footwear captured via a residential collection program and reused is removed from the waste stream.
- **Program Potential.** As shown in Figure 3.3, the national program potential for a residential clothing and footwear collection program is 1.6 million tons per year.

CASE STUDY: Montgomery County, Maryland

In 1993, Montgomery County, Maryland, initiated a textile collection program consisting of a drop-off site for residents and "curbside" collection for five charities. The county developed a brochure that described the program and also listed charities, shelters, consignment shops, and used clothing stores accepting textile donations. The brochure was made available at libraries and county offices and also mailed to residents upon request. The county collects approximately 156 tons of textiles annually. Dumont, a textile dealer, pays the county a flat rate of $80.00 per ton for the collected textiles.

Figure 3.3. Program potential for clothing and footwear reuse.



Chapter 4
CII Source Reduction Options

National Program Potential

This chapter presents estimates of national program potential for three CII source reduction program options: reducing office paper, converting to multi-use wooden pallets, and reducing paper towels. Table 4.1 shows that, for 1994, the national program potential associated with these three options is 3.1 million tons.

Table 4.1. National Program Potential for CII Source Reduction Options

Source Reduction Option	Component of MSW Reduced	Program Potential (Million Tons)
Office paper prevention	Paper and paperboard	1.3
Converting to multi-use pallets	Wood	1.6
Paper towel reduction	Paper and paperboard	0.2
Total		**3.1**

Office Paper Prevention

To calculate the program potential for reducing office paper, two source reduction strategies were assumed:

- All office copy paper could be subject to a duplex copying initiative.
- For those businesses that have some computer network capability, the amount of paper currently used in laser printers can be reduced through electronic mail, electronic postings, and document sharing via common files. While increased use of networking could itself reduce the demand for copying, this manual does not include the effect of this complex interaction.

The results from the two strategies are combined to represent an approximate total program potential for reducing office paper.

Office paper reduction programs often entail setting a corporate goal for paper reduction, publicizing that goal through posters, flyers, and company newsletters, and encouraging employees to adopt specific paper reduction strategies.

CASE STUDY: U.S. Environmental Protection Agency

Launched in 1994, EPA's Paper-Less Office Campaign set a goal to reduce the amount of white office paper used throughout the Agency by 15 percent. The campaign encouraged employees to use specific strategies such as making duplex copies and increasing the use of computer networking. EPA exceeded its goal in 1995 by reducing photocopying by 16.1 percent.

Reducing Office Paper Through Duplex Copying

Program Potential

- **General Waste Category.** The general waste category addressed by office paper reduction is paper and paperboard. As shown in Table 2.1, the paper and paperboard tonnage reported in the '95 Update is 81.3 million tons.
- **Applicability Factor.** This factor reduces the waste tonnage to reflect only the tonnage of paper and paperboard used for photocopying. According to CAP Ventures, a trade association that tracks office paper use, 2.12 million tons of office paper were used in photocopiers in 1994. This represents about 2.6 percent of the paper and paperboard waste reported in the '95 Update. Therefore, the portion of applicable paper is 2.6 percent.
- **Feasibility Factor.** The office paper tonnage is narrowed further to identify the portion of copier paper that could be duplexed easily. According to INFORM Inc., a nonprofit research organization, 1.1 percent of copier paper is used in copy machines that have no duplex capabilities. An additional 26 percent of copier paper is used by copiers with limited duplex capabilities, so only 73 percent of copier paper is used in machines with complete duplexing capabilities. Also, 20 percent of copies from machines with duplex capabilities have already been printed on both sides. Therefore, 58 percent (0.73 x 0.8) of copier paper could feasibly be source reduced.
- **Technology Factor.** With maximum participation, an office could use approximately 50 percent less paper by duplexing instead of single-siding copies. Therefore, the technology factor is 50 percent.
- **Program Potential.** As shown in Figure 4.1a, the program potential for reducing office paper use through duplex copying is 613,000 tons per year.

Reducing Office Paper Through Computer Networking

Program Potential

- **General Waste Category.** As in the analysis of duplex copying, the general category of waste addressed by office paper reduction through computer networking is paper and paperboard. As shown in Table 2.1, the paper and paperboard tonnage reported in the '95 Update is 81.3 million tons.
- **Applicability Factor.** This factor reduces the waste tonnage to reflect only the tonnage of office paper used in laser printers. According to CAP Ventures, 1.3 million tons of paper were used in laser printers in 1994. This represents about 1.6 percent of paper and paperboard generated. Thus, the portion of applicable paper is 1.6 percent.
- **Feasibility Factor.** This factor reflects the percentage of businesses that have computer networking capabilities. Based on the information from a 1994 survey by the Electronic Messaging Association, 65 percent of the branch offices of

Figure 4.1a. Program potential for office paper reduction (duplexing).

General Waste Category		Applicability Factor		Feasibility Factor		Technology Factor		Program Potential
Paper and paperboard generated	x	Percentage of paper and paperboard that is used in photocopiers	x	Percentage of copier paper used in copiers with good duplexing capacity that is not duplexed	x	Duplexing copies saves half the amount of paper used for single-sided copies	=	613,000 tons per year
81.3 million tons		2.6%		58%		50%		

Fortune 2000 companies have local area networks (LANs). In the absence of data on networking capabilities throughout the CII sector, the 65 percent figure is used to represent networking capabilities in offices. It is further assumed that 10 percent of computer printer paper use is already being prevented by companies' use of networks to reduce printing. Therefore, 59 percent (0.65 x 0.90) of printer paper can feasibly be source reduced.

- **Technology Factor.** It is assumed that 90 percent of paper used in laser printers can be reduced through computer networking, leaving 10 percent of a company's documents as being necessary to be printed out for review, distribution, or similar purposes. Therefore, the technology factor is 90 percent.
- **Program Potential.** As shown in Figure 4.1b, the program potential for reducing office paper through the use of increased computer networking is estimated to be 690,700 tons per year.

Converting to Multi-Use Pallets

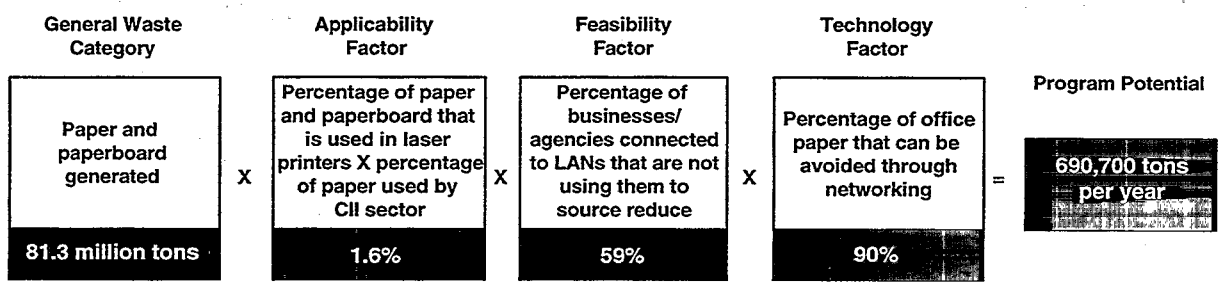
Wooden pallets are used extensively in transportation packaging. Most of these pallets are designed to be used a number of times, yet a substantial number are still "single-use." This section focuses on promoting the replacement of single-use wooden pallets with reusable or multi-use wooden pallets.

Multi-use wooden pallets are typically used in closed-loop delivery systems, such as in grocery stores—the largest users of multi-use pallets. Closed-loop systems help guarantee that the multi-use pallets, which are more durable and expensive than single-use pallets, are reused as often as possible. The nature of a delivery system places constraints on whether a multi-use pallet is a feasible alternative to single-use pallets. These limitations are addressed in the discussion below. Recent studies by the National Recycling Coalition and other organizations have mentioned alternatives to pallets, including strapping and slip sheets. While these do represent options for source reduction, the analysis here is focused on reductions associated with converting to multi-use pallets.

Program Potential

- **General Waste Category.** The general waste category addressed by converting to multi-use wooden pallets. As shown in Table 2.1, the wood tonnage reported in the '95 Update is 14.6 million tons.
- **Applicability Factor.** This factor reduces the waste tonnage to reflect only the fraction of national wood generation that is wooden pallets. According to the '95 Update, 70 percent of wood generated is wood packaging. Further, 94 percent of wood packaging generated is pallets. Thus, the amount of applicable wood waste is 65 percent (0.70 x 0.94).
- **Feasibility Factor.** The wooden pallet tonnage is narrowed still further to identify the amount that feasibly could be reduced. According to the '95 Update, about 48 percent of pallets are single-use. In addition, not all single-use pallet users can convert to multi-use pallets due to various constraints. In theory, all single-use pallets could be reused. In reality, however, one of the major logistical limitations to developing a multi-use pallet program is the back hauling necessary to reuse

Figure 4.1b. Program potential for office paper reduction (networking).



pallets within a closed-loop system. Based on this limitation and similar logistical requirements involved with establishing such a program, it is estimated that 50 percent of single-use pallet users can convert to multi-use pallets. Thus, the portion of wooden pallets that could feasibly be source reduced is 24 percent (0.48 x 0.5).

- **Technology Factor.** According to the U.S. Forest Service Laboratory, multi-use wooden pallets have a 15 percent loss rate. Single-use pallets, by definition, have a 100 percent loss rate. Therefore, a system using only multi-use wooden pallets will require only 15 percent of the pallets of a system using only single-use pallets.

  This does not mean that reusable pallets have a technology factor of 85 percent; an adjustment must be made for the fact that reusable pallets are heavier than single-use pallets. According to the National Wooden Pallet and Container Association, a multi-use pallet is twice as heavy as a single-use pallet. The technology factor for multi-use wooden pallets is 70 percent (1.00 – [0.15 x 2.0]).

- **Program Potential.** As shown in Figure 4.2, the program potential for converting to multi-use pallets is 1.6 million tons per year.

Paper Towel Reduction

The CII sector can prevent waste by looking into paper towel options in restrooms. Source reduction efforts can include installing roll paper towel dispensers, cloth towel dispensers, or hot air dryers. This manual focuses on the program potential for using roll paper towel dispensers as one example of a paper towel reduction program.

CASE STUDY: Cambridge, Massachusetts

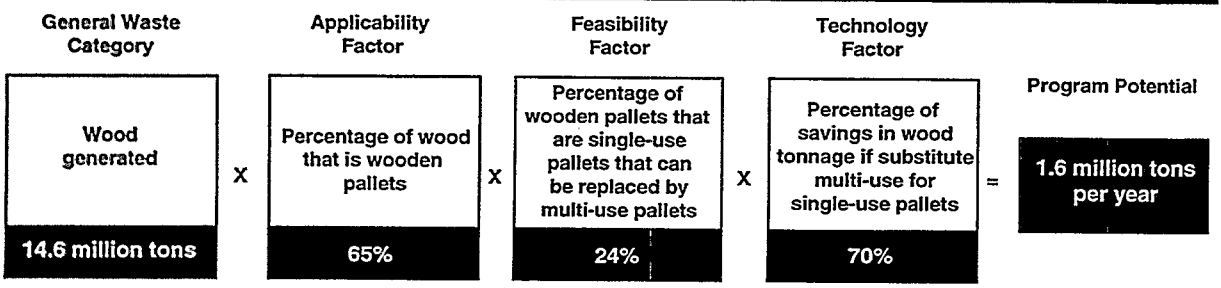
The city of Cambridge, Massachusetts, recently performed a study to calculate the potential paper and cost savings for a paper towel reduction program implemented at its city offices, where it employs 2,605 people. Currently, the city uses multi-fold paper towels. It estimated that in order to switch to roll paper towels, it would need to install 135 dispensers, at $35.00 each, including the labor required to install them. The total cost of implementation would be $4,725.00. Potential cost savings were estimated to be $12,488.00 per year. The amount of waste prevented would be 1.68 million square feet of paper towels, or 7.5 tons.

Program Potential

- **General Waste Category.** The general category of waste addressed by paper towel reduction is paper and paperboard. As shown in Table 2.1, the paper and paperboard tonnage reported in the '95 Update is 81.3 million tons.

- **Applicability Factor.** This factor reduces the waste tonnage to reflect only the tonnage of national paper and paperboard generation that is paper towels. According to the American Forest & Paper Association, 2.0 million tons of paper towels were produced in 1993. This

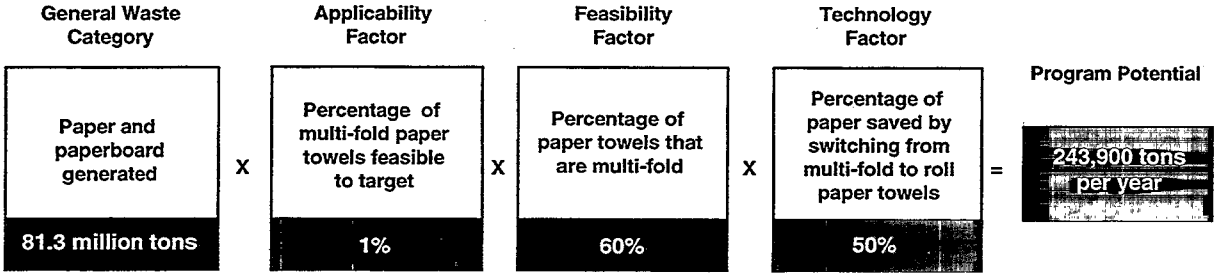
Figure 4.2. Program potential for converting to multi-use pallets.



represents about 2.4 percent of total paper and paperboard waste generation. According to the '94 Update, 40 percent of paper towel waste is generated by the CII sector. Thus, the portion of applicable waste is 1 percent (0.024 x 0.4).

- **Feasibility Factor.** The paper towel tonnage is narrowed further to identify the percentage that feasibly can be reduced. According to paper towel distributors, approximately 60 percent of paper towel production for the CII market are multi-fold towels. It is also assumed a small percentage of establishments will not switch to roll towels for a variety of reasons. Therefore, the portion of paper towel waste that could feasibly be reduced is 60 percent.
- **Technology Factor.** The technology factor reflects the amount of paper towel reduction due to switching from multi-fold to roll paper towels. In a 1994 newsletter article by the Building Owners and Managers Association (BOMA) of New York, a paper industry official presented a method for estimating the waste preventable by switching from multi-fold to roll paper towels. It is estimated that switching to roll paper towels could reduce waste by up to 50 percent.
- **Program Potential.** As shown in Figure 4.3, the program potential for reducing paper towels by replacing multi-fold towels with roll paper towels is estimated to be 243,900 tons per year.

Figure 4.3. Program potential for reducing paper towels.



Chapter 5
Local Applications

Introduction

The results presented in Chapters 3 and 4 indicate that the program potential for source reduction at the national level could be quite large. Table 5.1 summarizes the national program potential for the six source reduction options discussed in this manual.

Chapter 5 builds on the previous chapters by examining how national program potential can be applied at the local level. This chapter provides three examples illustrating how solid waste managers can calculate the source reduction program potential for their own local programs.

Program Potential Factors

The first step in calculating local estimates for source reduction program potential is to develop program potential factors. Program potential factors are derived by dividing the national program potential for a specific source reduction option (e.g., grasscycling), as shown in Table 5.1, by the total waste generated from the corresponding waste category (e.g., residential yard trimmings), as shown in Table 2.1. Therefore, the program potential factor for residential grasscycling is 33.1 percent, or

$$\left(\frac{\text{9.1 million tons (national program potential)}}{\text{27.5 million tons (residential yard trimmings)}}\right) \times 100$$

Table 5.2 presents the program potential factors for all MSW, residential waste, and commercial waste.

With these program potential factors in hand, local managers can use any mixture of national and local data to estimate source reduction program potential for their communities. Tables 5.3 and 5.4 provide default data taken from the '94 Update. Managers will need to use these tables as they proceed to develop their local source reduction program potential estimates.

Scenarios

The following three examples help illustrate how program potential factors can be applied to local conditions. They explain how to estimate local waste stream composition, and then how to compute local program potential.

Table 5.1. National Program Potential for Six Source Reduction Options

Source Reduction Option	Component of MSW	National Program Potential (Million Tons per Year)
Grasscycling	Yard trimmings	9.1
Home composting	Food scraps & yard trimmings	13.0
Clothing reuse	Other	1.6
Office paper prevention	Paper and paperboard	1.3
Converting to multi-use pallets	Wood	1.6
Paper towel reduction	Paper and paperboard	0.2
TOTAL		**26.8**

Table 5.2. Program Potential Factors

Source Reduction Option	General Waste Category	Program Potential Factors (Percent) for All MSW	Residential Waste	Commercial Waste
Grasscycling	Yard trimmings	29.7	33.1	
Home composting	Food scraps	26.9	54.3	
	Yard trimmings	30.1	33.5	
Clothing reuse	Other	8.2	16.0	
Office paper prevention:	Paper and paperboard			
Duplexing		0.8		1.4
Networking		0.8		1.5
Total		1.6		2.9
Converting to multi-use pallets	Wood	11.0		14.4
Paper towel reduction	Paper and paperboard	0.3		0.5

Table 5.3. Default Waste Composition (Percent by Weight)—National Default Data

Waste Category	Composition (Percent) Residential	CII	All MSW
Paper and paperboard	30	51	39
Glass	9	3	6
Metals	9	6	8
Plastics	13	5	9
Wood	3	13	7
Food scraps	6	8	7
Yard trimmings	23	4	15
Other	7	10	9
Total	100	100	100

Table 5.4. Waste Generation—National Default Data

Sector	Generation Rate (Tons/Year) Per Person	Per Household
Residential	0.5	1.3
All MSW	0.8	2.2

Scenario 1: Anywhere

Background: In Anywhere, the local solid waste manager handles the entire MSW stream amounting to 40,000 tons a year. The manager has no local data on waste stream composition. However, as its name suggests, Anywhere's waste stream can be expected to be similar in composition to the national average. The manager can apply national waste composition data to the program potential factors for 'All MSW' to estimate program potential for the six options.

Determine the Waste Composition: Because Anywhere's solid waste manager does not know the current waste composition, he can use national waste composition data from the '95 Update (see Table 5.3) to estimate local waste composition. The solid waste manager applies the percentages to the 40,000 tons to determine his annual waste composition. The results are presented in Table 5.5.

Table 5.5. Anywhere—Waste Composition

General Waste Category	Waste Composition (Percent)	Waste Composition (Tons)
Paper and paperboard	39	15,600
Glass	6	2,400
Metals	8	3,200
Plastics	9	3,600
Wood	7	2,800
Food scraps	7	2,800
Yard trimmings	15	6,000
Other	9	3,600
Total	**100**	**40,000**

Apply the Program Potential Factors: The manager estimates the local program potential for the six source reduction options included in this manual by applying the 'All MSW' program potential factors from Table 5.2 to the waste composition calculated in Table 5.5. His calculation is shown in Table 5.6.

Program Potential: The total program potential for Anywhere is 4,702 tons, or about 12 percent of Anywhere's waste stream.

The only subtle point in Table 5.6 is the development of the tonnage of yard trimmings available for home composting. To avoid double counting, the 1,782 tons of grass that might be grasscycled is removed from the 6,000 tons of yard trimmings to which home composting might otherwise apply.

The general approach taken for Anywhere does not depend on managing all MSW. This two-step approach can also be taken if the local manager knows the tonnage from the residential or CII sectors. Waste composition percentages and program potential factors for the 'residential' or 'CII sector' would simply be used in place of the 'All MSW' data.

Table 5.6. Anywhere—Program Potential

Source Reduction Option	General Waste Category	Tonnage	Program Potential Factor (Percent)	Program Potential (Tons)
Grasscycling	Yard trimmings	6,000	29.7	1,782
Home composting	Food scraps	2,800	26.9	753
	Yard trimmings	4,218	30.1	1,270
Clothing reuse	Other	3,600	8.1	292
Office paper prevention	Paper and paperboard	15,600	1.6	250
Converting to multi-use pallets	Wood	2,800	11.0	308
Paper towel reduction	Paper and paperboard	15,600	0.3	47
Total				**4,702**

Table 5.7. Commuterburgh—Grasscycling

Population	50,000
Tons per person per year	x 0.5
Waste generation (tons)	= 25,000
Yard trimmings (percent)	x 0.23
Yard trimmings (tons)	= 5,750
Program potential factor (percent)	x 0.331
Program potential for grasscycling (tons/yr)	= 1,903

Scenario 2: Commuterburgh

Background: In Commuterburgh, population 50,000, a group of local citizens is interested in promoting grasscycling to reduce the residential

waste stream. The group can use national data on generation, composition, and source reduction, together with their limited local data, to evaluate the savings possible from grasscycling.

Determine the Waste Composition: Without any information on local waste generation available, the group can use national data to estimate the local program potential for grasscycling. The composition and generation data used in Table 5.7 are taken from Tables 5.3 and 5.4.

Apply the Program Potential Factors: The group then multiplies the total tons of yard trimmings by the program potential factor for residential grasscycling to estimate the program potential.

Program Potential: The program potential for grasscycling in Commuterburgh is 1,903 tons per year.

Scenario 3: Fullville

Background: In Fullville, the local solid waste manager is responsible for residential and CII waste. She is interested in applying several of the CII program potential factors to the 10,000 tons of CII waste she manages. Unlike the manager in Anywhere, the manager knows the composition data and even knows that there are 200 tons of pallets in the waste stream.

Determine Waste Composition: The development of the CII waste composition for Fullville is shown in Table 5.8.

Apply Program Potential Factors: In Table 5.9, the tonnage of general waste is drawn from Table 5.8. With the exception of converting to multi-use pallets, the program potential factors are the CII factors from Table 5.2. For multi-use pallets, the program potential factor needs to be customized to reflect the fact that there are 200 tons of pallets in the local waste stream.

Based on the information from Chapter 4, Figure 4.2 shows that the program potential for converting to multi-use pallets is the product of applicability, feasibility, and technology factors. The applicability factor is the "percentage" of wood that is wooden pallets. Here the manager knows the actual tonnage. To figure the percentage, the manager divides the total number of tons of pallets by the total number of tons of wood waste. Based on the waste composition shown in Table 5.8, 19 percent (200 ÷ 1,060 = 0.19) of the wood waste is pallets. Multiplying by the feasibility (24 percent) and technology (70 percent) factors, and dividing by the percent commercial waste category (see Table 6.1) or 76 percent, the manager figures the custom program potential factor of 4.2 percent shown in Table 5.9.

Program Potential: For Fullville's CII waste, the local program potential for three source reduction programs is 249 tons per year.

Having completed the analysis of program potential, the manager also wishes to consider the savings that might be achieved if a source reduction program were implemented for office paper. In preparing an analysis of cost savings, Fullville's manager needs to estimate the following:

Table 5.8. Fullville—CII Waste Composition

General Waste Category	Waste Composition (Percent)	Final Composition (Tons)
Paper and paperboard	60.0	6,000
Glass	2.5	250
Metals	4.6	460
Plastics	4.1	410
Wood	10.6	1,060
Food scraps	6.5	650
Yard trimmings	3.3	330
Other	8.4	840
Total	**100**	**10,000**

- The percentage of the program potential that could be achieved during the first year of implementation. Based on experiences with other source reduction programs, the manager feels that Fullville could achieve 30 percent of the program potential for the community.
- The cost of the source reduction program. Fullville's manager has budgeted $500.00 for the costs of an office paper prevention program.
- The avoided system costs of a source reduction program. A source reduction program will affect the tonnage of materials recycled and disposed of. For instance, the revenue currently being generated in Fullville for its office paper recycling program will decrease after a source

Table 5.9. Fullville—CII Program Potential

Source Reduction Option	General Waste Category	General Waste Tonnage	Program Potential Factor (Percent)	Program Potential (Tons/Yr)
Office paper prevention	Paper and paperboard	6,000	2.9	174
Converting to multi-use pallets	Wood	1,060	4.2*	45
Paper towel reduction	Paper and paperboard	6,000	0.5	30
Total				**249**

*Custom source reduction factor (see page 20).

reduction program is in place. Whether this lost revenue is included in the net savings calculation depends on the perspective of the program implementor. Other costs, such as collection and processing costs, may also fluctuate, since there will be fewer materials for trash and recycling crews to collect. These costs will vary in each community, and will have to be estimated by managers if actual figures are not available.

In order to estimate the net savings of a program, Fullville's manager will also need to analyze the following:

- The percentage of office paper that is currently recycled. Fullville estimates that it is recycling 20 percent of its office paper.
- The price per ton (revenue or net benefit) from an office paper recycling program. Fullville is receiving $10.00 a ton for office paper.
- The tipping fee or disposal costs for the community. The tipping fee at Fullville's landfill is $35.00 a ton.

When estimating net savings, the manager begins with the local program potential factor for office paper prevention. The program potential for office paper prevention in Fullville is 174 tons. Based on her professional judgment, Fullville's manager feels that the community could achieve 30 percent of the program potential. To derive the potential tons preventable, the manager multiplies the program potential by the percent achievable to obtain 52.2 tons (174 x 0.3).

To determine the financial impact of an office paper program, Fullville's manager considers the current waste management costs.

The Fullville manager decides that the collection costs are insignificant and is not factoring in these costs. Collection costs could include labor, vehicle maintenance, gasoline use, and other budget concerns.

Then, the manager considers avoided disposal costs. Since Fullville currently recycles 20 percent of its office paper, it is assumed that 80 percent is disposed of. Therefore, 80 percent of the estimated source reduction of office paper, or 41.8 tons (52.2 x 0.8), will not be disposed of. Given a tipping fee of $35.00 a ton, the Fullville manager multiplies the amount of paper source reduced by the disposal cost, which equals $1,463.00 (41.8 tons x $35.00).

The Fullville manager knows that the business community recycles 20 percent of its office paper. To derive the amount of paper that will no longer be recycled due to a source reduction program, the manager multiplies the amount achievable by the percent currently being recycled. This is 10.4 tons (52.2 tons x 0.2). She also knows that the paper recycling program is profitable, generating a net revenue of $10.00 a ton. Once the source reduction program is implemented, Fullville will no longer receive the revenue from this portion of the paper reduced. Thus, with the office paper source reduction program in operation, Fullville will not generate $104.00 (10.4 x $10.00) a year in revenues.

Table 5.10. Fullville—Net Savings of an Office Paper Prevention Program

Net Savings Calculations

Source Reduction Option:	**Office Paper Prevention**
Program Potential	174 tons
Percent Achievable	30%
Amount Preventable	52.2 tons
Impact on Current Waste Management Costs:	
Impact on collection costs	$0.00
Impact on disposal costs	$1,463.00
Impact on revenues from recycling	($ 104.00)
Total	$1,359.00
Program Costs	($ 500.00)
Total:	
Net Savings	$ 859.00

Next, the manager plans to engage in a program of educational outreach, informing the business community about the savings it could achieve through office paper reduction. She budgets $500.00 for the first year's program.

Finally, the manager computes the net impact of the source reduction program, taking into account the loss of recycling revenues as well as the avoided disposal costs. The result is $1,359.00 ($1,463.00 - $104.00). Subtracting the program costs, the manager finds that the town will save $859 per year ($1,359 - $500).

In accounting for current waste management costs, the cost for composting would be similar to those for recycling. First, the manager would estimate the percentage of materials that are currently being composted. This percentage, multiplied by the tonnage to be prevented by a source reduction program (52.2 tons) would yield the total tonnage composted. The associated cost impact can be found by multiplying the tonnage composted by the net cost or revenue due to composting the paper. This cost would be added to the estimate of the program impact on current waste management costs.

Chapter 6
Worksheets

Introduction

The five worksheets included in this chapter are used to calculate:

- Waste generation
- Waste composition
- Program potential
- Net savings
- Custom program potential factors

The first three worksheets are designed to help managers calculate the local program potential for source reduction. The last two worksheets allow managers to evaluate associated savings and develop 'custom' program potential factors. For a copy of the companion software that allows the user to perform these calculations automatically, contact the RCRA Hotline at 800 424-9346.

Worksheets A1 and A2: Waste Generation

These worksheets enable managers to calculate the tonnage of waste generated in the sector (e.g., residential, CII, or all MSW) they are analyzing. Managers have three options for developing this tonnage:

1. Estimating generation directly.
2. Adding estimates of the tonnage recycled, composted, and disposed of as trash.
3. Estimating the tonnage based on either the population or the number of households in their locality. This option can be used only if managers are analyzing the residential sector or all MSW.

Options 2 and 3 require simple calculations. Worksheets A1 and A2 are provided for this purpose.

Managers who use the third option will need to specify the unit (population or households) on which the calculation will be based. Their choice will be based on the availability of local data. Tons of waste generated per resident (or per household) can be based on the national EPA default data, as shown in Table 5.4, or on local data.

Worksheet B: Waste Composition

This worksheet enables managers to develop waste composition data for the sector they are analyzing.

Worksheet B has been designed to make use of available local data on generation and waste stream composition. At the bottom of the column headed 'Final Composition,' managers should enter their estimate of the total tonnage of waste generated. Next, the number of tons collected for any of the eight waste categories, if known, should be entered in the 'Known Composition' and 'Final Composition' columns. If managers know the tonnage for each of these categories, they are finished with Worksheet B once they enter the tonnages in the 'Known Composition' and 'Final Composition' columns.

Managers lacking local data will need to rely on default data. Table 5.3 provides national default data on the percent of the waste stream for each waste category. In the column headed 'Default Composition (Percent by Weight),' managers should enter the default percentage for each waste category. They can then multiply each percentage by the total tonnage (shown at the bottom of the 'Final Composition' column) and enter the results in the column headed 'Default Composition (Tons/Year).' They are then finished with Worksheet B.

Worksheet C: Program Potential

This worksheet enables managers to develop estimates of program potential for the sectors they are analyzing.

To use Worksheet C, managers should first enter the waste tonnage to which each source reduction option will apply. This tonnage can be taken from the 'Final Composition' column on Worksheet B. In the case of home composting, managers may wish to adjust the composition data. They can decide whether food scraps are included in the home composting program. They can also decide to reduce the portion of yard trimmings included in the program, by adjusting to avoid double-counting with grasscycling, for example. To do this, managers will need to compute the program potential for grasscycling and subtract the results from the tonnage of yard trimmings available for home composting.

Once the tonnage for each waste category is specified, completing Worksheet C simply requires selecting the program potential factors, as shown in Table 5.2. Alternatively, managers can develop custom factors for some or all of the source reduction options using Worksheet E.

Worksheet D: Net Savings

This worksheet allows managers to estimate the net savings they might expect through source reduction. The worksheet is designed to address one source reduction option at a time. The Fullville scenario (see pages 20-22) takes the reader through a step-by-step analysis of how to complete this worksheet.

Worksheet E: Custom Program Potential Factors

This worksheet provides an opportunity to develop 'custom' program potential factors that can be used in place of the standard factors shown in Table 5.2. Solid waste managers may want to develop custom program potential factors to reflect local data or information. For instance, a manager might want to change the technology factor in order to capture known information on a community's current yard trimmings program. In order to develop custom factors, managers must change the inputs, or the applicability, feasibility, or technology factors, in the standard program potential factors. These inputs, as well as the resulting standard factors, are shown in Table 6.1.

Continuing with the yard trimmings scenario, a manager knows that he would want to change the technology factor from 100 percent to 80 percent. In order to customize the program potential factor, the calculation is computed as follows:

0.45	x	0.6	x	0.80	=	0.238
(Applicability factor)		(Feasibility factor)		(Technology factor)		(All MSW factor)

To develop a residential program potential factor for yard trimmings, the "All MSW" factor must then be divided by 90 percent (to reflect the percentage of yard trimmings generated by the residential sector in Table 6.1), or 0.90, as follows:

0.238	÷	0.90	=	0.264
(All MSW factor)		(Residential)		(Residential grasscycling factor)

If a manager wanted to develop a yard trimmings program potential factor for CII, then the "All MSW" factor would then be divided by 10 percent.

Any of the other program potential factors presented in this manual may also be customized to take advantage of known local data and expertise.

Worksheet A1. Waste Generation

Total tonnage of garbage collected		_____
Total tonnage of recyclables collected	+	_____
Total tonnage of compostables collected	+	_____
Total waste generated	=	_____

Worksheet A2. Waste Generation

Number of units in your jurisdiction		_____
Tons of waste generated per unit per year	X	_____
Total tonnage of waste generated	=	_____

Worksheet B. Waste Composition

Waste Category	Default Composition (Percent by Weight)	Default Composition (Tons/Year)	Known Composition (Tons/Year)	Final Composition (Tons/Year)
Paper and paperboard				
Glass				
Metals				
Plastics				
Wood				
Food scraps				
Yard trimmings				
Other				
Total				

Worksheet C. Program Potential

Source Reduction Option	General Waste Category	General Waste Tons	Program Potential Factor	Program Potential
Grasscycling	Yard trimmings			
Home composting	Food scraps			
	Yard trimmings			
Clothing reuse	Other			
Office paper	Paper and paperboard			
Multi-use pallets	Wood			
Paper towels	Paper and paperboard			
Total				

Worksheet D. Net Savings

Net Savings
Source Reduction Option

Source Reduction Option: _____

A	Program Potential	_____ tons
B	Percent Achievable	_____ %
C	Amount Preventable	_____ tons

Impact on Current Waste Management Costs:

D	Impact on collection costs	$ _____
E	Impact on disposal costs	$ _____
F	Impact on revenues from recycling (including composting)	$ _____
	Total	$ _____
G	Program Costs	($ _____)

Total:

H	Net Savings	$ _____

Footnotes

A=Program potential estimate.

B=User estimate of first year program impact.

C=AxB

D=User estimate of the impact of the source reduction option on collection costs.

E=User estimate of the impact of the source reduction option on disposal costs.

F=User estimate of the lost revenues from recycling (including composting) due to the estimated impact of the source reduction option.

G=Annual source reduction option operating cost or budget estimate.

H=D+E–F–G

Table 6.1. Standard Program Potential Factors

Source Reduction Option	Waste Stream Data: General Waste Category	% of General Waste Category Residential or Commercial	Applicability Factor	Feasibility Factor	Technology Factor	Program Potential Factors (Percent) for: All MSW	Residential Waste	Commercial Waste
Residential								
Grasscycling	Yard trimmings	90%	45	66	100	29.7	33.1	N/A
Home composting	Food scraps	50%	36	74	100	26.9	54.3	N/A
	Yard trimmings	90%	81	74	100	30.1*	33.5*	N/A
Clothing reuse	Other	51%	8.3	97	100	8.2	16.0	N/A
Commercial								
Office paper	Paper/paperboard							
Duplexing		55%	2.6	58	50	0.8	N/A	1.4
Computer networks		55%	1.6	59	90	0.8	N/A	1.5
Total						1.6	N/A	2.9
Multi-use pallets	Wood	76%	65	24	70	11.0	N/A	14.4
Paper towels	Paper/paperboard	55%	1	60	50	0.3	N/A	0.5

* excluding the national program potential for grasscycling.

Worksheet E. Custom Program Potential Factors

Source Reduction Option	Waste Stream Data: General Waste Category	% of General Waste Category Residential or Commercial	Applicability Factor	Feasibility Factor	Technology Factor	Program Potential Factors (Percent) for: All MSW	Residential Waste	Commercial Waste
Residential								
Grasscycling	Yard trimmings							
Home composting	Food scraps							
	Yard trimmings							
Clothing reuse	Other							
Commercial								
Office paper	Paper/paperboard							
Duplexing								
Computer networks								
Total								
Multi-use pallets	Wood							
Paper towels	Paper/paperboard							